30th May 2017

SP Energy Networks Response

Scottish Energy Strategy:
The future of energy in Scotland

Scottish Government Consultation

SP ENERGY NETWORKS

Contents

1 INTRODUCTION

We are pleased the Scottish Government has released a consultation that endeavours to outline the future strategy for energy in Scotland and also that it is recognised that the Scottish network companies will play a key role in realising this strategy. In providing a response to the consultation we have outlined a range of topics that need to be addressed to realise a future low carbon economy in Scotland. Where possible we will refer these back to the consultation document itself. We also believe that there would be benefit in discussing the challenges that we outline separately and that they will need to be addressed or acknowledged in the final energy strategy publication.

2 ABOUT SP ENERGY NETWORKS

SP Energy Networks is the networks business of Scottish Power and holds three electricity network licences. We own and operate the electricity distribution networks in the Central Belt and South of Scotland (SP Distribution) which serves two million customers, and Merseyside and North Wales (SP Manweb) which serves one and a half million customers. We also own and maintain the electricity transmission network in the Central Belt and South of Scotland (SP Transmission), which is operated by National Grid, in its role as the National Electricity Transmission System Operator of Great Britain.

The supply and generation businesses in the Scottish Power group are legally, managerially and operationally separate to the networks business as required by the licencing regime and the EU Third Package. SP Energy Networks is therefore “ring fenced” from the other parts of the Scottish Power group.

Our functions and duties are governed by our licences and by relevant legislation. We are subject to full economic regulation unlike the competitive sectors of the energy market and our charges are monitored and regulated by Ofgem under the “price control” process.

Electricity networks provide high quality and reliable supplies of electricity to homes and businesses 365 days a year, 24 hours each day and with safety at the heart of everything we do. Over the last 8 years we have reduced customer interruptions by c.25%. Over that period we have reduced customer minutes lost by c.35%. We are also continuing to improve our customer service. SP Distribution’s average score (out of 10) in the industry survey of customer satisfaction increased from 7.0 to 8.8. This compares extremely favourably with the very best companies in other sectors, which score between 8 and 9 out of 10.

We expect to invest £4.7 billion on the Distribution network over the current price control period (2015-2023) and £2.6 billion on the Transmission network (2013-2021). The majority of this expenditure is on refurbishing and maintaining the ageing network, which was largely built between the 1950s and 1970s. The current replacement cost of our entire distribution networks would be over £16 billion.

The daily cost of this service (per household) is less than the cost of a first class stamp and less than a TV licence annually. We believe networks companies are delivering fantastic value for money to consumers; however, we recognise that we need to adapt to the changing external environment which is why we are developing a new business model called the "distribution system operator". We will provide further explanation of this later in this response.

3 NETWORK CHALLENGES

In developing towards the low carbon network of the future it is essential that network operators maintain their focus on providing security of supply to existing and future customers. This will be especially challenging given the closure of large scale thermal plant across the UK. New and innovative approaches will be needed to ensure that the changing mix of generation can contribute to provide system recovery actions following a potential high impact, low probability black start event.

The consultation highlights a range of key statistics on the capacity of installed generation in Scotland. This can be misleading as generators may be unable to provide this level of capacity at any given time. This could be due to network constraints, weather conditions and a range of other factors.

3.1 SYSTEM SECURITY AND BLACK START

A safe and reliable supply of energy underpins the continued growth of the Scottish economy and delivery of key services. The draft Energy Strategy recognises the importance of resilience in our energy supply and we believe that the Scottish Government has a good understanding of this issue. For example, paragraph 20, is clear that the key factors underpinning a stable and managed transition are a balanced energy supply, including energy storage and new thermal plant, which is a view we share. However, we believe that this may be at odds with the Scottish Government's proposed 2030 'all energy' renewables target. Whilst we are supportive of this target, it is our firm view that there is a continued need for large synchronous generators until the benefits to the system that they provide can be supplied form alternative sources.

The coal-fired electricity generating stations at Cockenzie and Longannet ceased generation in 2013 and 2016 respectively, and the gas-fired generating station at Peterhead has reduced its Transmission Entry Capacity (TEC) to zero from April 2018. In the period from 2020 to 2030, the closure of the existing fleet of nuclear Advanced Gas Reactor (AGR) generating stations across Great Britain (GB), in particular the two AGR stations located in Scotland and three AGR stations in the north of England, is a major consideration with the potential to present significant challenges on both a Scotland and GB wide basis.

Our view is that the risk of failing to meet winter peak electricity demand in Scotland remains low in the period to the end of the current decade, but it is increasing. Investment solutions that will deliver increases in south-north transmission capacity (England-Scotland and central-northern Scotland) are in construction and will improve the situation, but questions around system

resilience in a Scottish context, and the mix and availability of sufficient generation capacity in a GB context, are of some concern.

In the event of a regional or national shutdown of the electricity supply system, the future operating regime and operational status of large thermal power stations will be a determining factor in the speed with which any 'Black Start' recovery can be affected. The continued de-carbonisation of the electricity system is having a fundamental impact on the location and nature of electricity generation sources, and is leading to extended recovery profiles in some areas of GB, including Scotland.

We do not believe current investment levels in the short term in the UK for large synchronous generation are sufficient to mitigate these risks in the medium term. We are engaging with Ofgem, National Grid as the transmission system operator and other industry partners to jointly identify and deliver a range of measures to protect the interests of current and future consumers. Furthermore, as the BREXIT negotiations remain unclear, we are concerned that the UK places an overreliance on EU interconnectors. It is therefore important that we retain a sufficient, safe and secure domestic supply.

3.2 PROVISION OF BASE LOAD

Scottish network operators have been, and will continue to be, facilitators for the connection of low carbon distributed generation, however by its nature most forms of renewable energy are intermittent and uncontrollable. This leads to an increasingly difficult task of balancing the network generation capability and demand requirements.

Historically, base load requirements (the load that as a country we will always use and must be provided for regardless of whether or not renewable generation is generating) in the UK have been met by thermal plant including nuclear and fossil fuel. With the closure and planned closure of much of this capability, particularly in Scotland, it is essential that the future generation mix is capable of meeting the needs of our customers.

Interestingly, the South Australian Government's Energy Strategy states that it will build and own its own gas fired electricity generation as investment in new thermal generation has stalled due to the lack of clear national policy,.[1] This generation will provide up to 250 megawatts of electricity capacity, which would be switched on in times of emergency.

[1] http://ourenergyplan.sa.gov.au/assets/our-energy-plan-sa-web.pdf

3.3 NETWORK CONSTRAINTS

In Scotland renewable generation has typically been installed in resource rich, demand light geographical areas. This has resulted in both a change to how our assets operate (net exporting distribution substations), and to a number of physical thermal constraints on the electrical network (highlighted in paragraph 21). These constraints occur when the level of generation (or demand) exceeds the physical capability of our assets. In addition to thermal constraints we are also facing an increasing challenge due to fault level constraints, primarily driven by generating equipment that frequently operates below its rated capacity, e.g. wind and hydro.

We have been working on a range of innovative technical and commercial solutions to mitigate the impact of constrained networks. In each case we will seek the lowest overall lifecycle solution, which may ultimately be conventional reinforcement. A range of our solutions to address network constraints are outlined below:-

- **Flexible Connections** – Building on the learnings of our Accelerating Renewable Connections (ARC[2]) project we have started to offer a range of flexible connection solutions to our customers. These enable our customers to advance the date of connection to our network, often at significantly reduced cost, in return for acceptance that they may be constrained in real time based on network requirements. This will ultimately make better use of the existing assets that we already have, removing the requirement for conventional reinforcement in many instances.

- **Queue Management** – When customers seek to connect to a network that is already at maximum capacity they will often be unable to connect until reinforcement works take place. Where multiple customers are seeking to connect they will join a queue. The demand for network capacity in some network areas has led to significant queued capacity, with a range of projects with varying likelihoods of ultimately connecting. To ensure stalled projects do not prevent genuine projects from commencing we have launched our new queue management policy.[3]

- **Under-utilised capacity** – Network operators have historically agreed a maximum export capacity with connecting generation customers. As generation customers can theoretically export at any time up to their maximum export capacity this is how our network was designed. Identifying that customers do not necessarily utilise this full capacity we wrote to customers utilising <75% of the agreed capacity to reduce it and free up capacity for other customers. This was not hugely successful (~10MW reclaimed), largely driven by a lack of legislative powers. With greater ability to 'claw back' this capacity we could free up additional capacity.

[2] https://www.spenergynetworks.co.uk/pages/arc_accelerating_renewable_connections.aspx
[3] https://www.spenergynetworks.co.uk/userfiles/file/Queue_Mgt_Policy_Communication_Dec_2016v3.pdf

- **Statement of Works** – Where a distribution connection has the potential to significantly impact on the transmission system a process called Statement of Works must be followed. This process involves notification to National Grid who determine the potential impact of a new connection on the transmission network and identify, where relevant, any cost implications for the customer. Typically taking a year to provide this information, this has been a major barrier to customers understanding the cost of their connections and therefore securing financial backing. SP Energy Networks has championed an improved process that will enable distribution companies to access this information at a significantly earlier stage, allowing them to provide this information in a customer's initial offer. In conjunction with National Grid we are trialling this revised process in Scotland.

Further detail on our actions to address network constraints can be seen in our Incentivised Connection Engagement (ICE) report[4].

An example of our innovative approach can be shown in Dumfries and Galloway, which has a network area rich in natural resources, but has relatively low demand requirements. With the large volumes of DG now connected to the network, Dumfries and Galloway is now a net exporter of energy. There is currently 190MW of demand with 340MW DG connected and a further 660MW contracted to connect to the network

Our transmission price control plans (RIIO T1) included a solution to facilitate the connection of the contracted generation (both Transmission and Distribution) within the Dumfries and Galloway network. The UK System Operator subsequently determined that this was not a cost effective option and as a result we are seeking to facilitate the connection of this generation through the deployment of innovative solutions, including the submission of an Innovation Rollout Mechanism (IRM) bid to Ofgem. This IRM bid proposes funding for a project which will deliver connections to the entire network area on an actively managed basis. We also plan to transition Dumfries and Galloway to a Distribution System Operator (DSO) enabled network (further detail is provided in section 4.5 below).

4 PREPARING OUR NETWORKS FOR THE FUTURE

There are a number of solutions, which can help to meet the challenges outlined above, so long as they are tackled through the cooperation of Government, Regulators and Industry. It is also essential that customers are informed and engaged if they will be affected by changes to licencing, policy or tariff design. It should however be recognised that although there are a range of innovative solutions, which may reduce the marginal cost of facilitating a low carbon future, there will ultimately be a requirement for investment in the electric networks. This is due to physical assets that have physical limits and have been designed for a different use than that forecast in the Scottish Energy Strategy.

4.1 FUTURE SCENARIO PLANNING

[4] https://www.spenergynetworks.co.uk/userfiles/file/2016_17_Ice_Submission_Final_Report_310516.pdf

The consultation document sets out a range of renewable energy and low carbon aspirations from 2020 through to 2050. In order to realise these aspirations a detailed breakdown of the network impact will be required such that we can prepare the network and avoid being a barrier to a future low carbon economy.

The scenario planning used to determine the reinforcement requirements within the RIIO price control settlements were based on the 2012/13 National Grid Future Energy Scenarios[5]. Further work was then carried out by EA Technology, to disaggregate these scenarios by geographical area for the distribution price controls.

The current electricity transmission and distribution price control periods end in 2021 and 2023 respectively and the next price control periods will cover the periods 2021-2029 and 2023-2031 respectively. With negotiation periods starting 2-3 years prior to commencement it is essential that we have as clear a picture of the future network requirements in order to minimise costs for our customers. We will plan for flexible solutions where possible that provide least regrets investment across a range of scenarios but lower levels of uncertainty will be of benefit to UK consumers.

4.2 NEW TECHNOLOGIES

A range of new and emerging technologies could assist in meeting the network challenges implicit in a future low carbon economy.

Battery storage allows the shifting of electricity delivery to avoid peak times of demand or generation on the network, avoiding in some cases the requirement for reinforcement. The market for electricity storage is rapidly growing with a range of services now being offered by National Grid in its role as transmission system operator.

Active Network Management facilitates the real time management of generation and loads on the network and provides network operators with the ability to offer faster connections at a reduced cost to generators looking to connect to parts of the network which would otherwise be deemed to be at full capacity.

Expanded DSR enables customers to respond to a signal to change the amount of energy they consume from the electricity network at a particular time. DSR has the potential to contribute significantly to the transition to a low carbon economy, enhance security of supply and have a positive impact (reduction) on consumer bills.

Currently, consumers find out about DSR services through National Grid's Power Responsive Programme. For domestic / small non-domestic consumers to partake in DSR they need to find a way to aggregate their effect with other domestic / small non-domestic consumers to make a meaningful impact to the network. This can be achieved through the use of aggregation services and will be supported by a future DSO model.

[5] http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Documents-archive/

Other technologies now used by network operators to facilitate flexible connections include:

Timed Capacity Connections	This solution offers a connection with a fixed level of Curtailment. The **User** manages their import/export level within a prescribed operating schedule agreed within their **Connection Agreement**.
Export Limiting Devices	Automated equipment at the **User's** substation controls the customer's demand / generation to ensure that the **User's** Agreed Export Capacity is not exceeded.
Local Management Schemes	Network feeder monitoring it taken from the protection panels located at the **User's** site. Capacity is temporarily reduced for prescribed feeder outages or monitored voltages / currents exceeding the limits prescribed in the **Connection Agreement**.
Remote Intertrip Schemes	Capacity is temporarily reduced to a pre-defined level (which may be zero) for prescribed system abnormal network conditions. These may be distant from the customer's site and are monitored in real-time.

It is also important to accept that many of the technologies outlined above seek to maximise the utilisation of our existing asset base, which will result in an increase in the system losses inherent in any energy system. By facilitating additional renewable generation sources this will likely result in a net reduction in CO^2 emissions, however this should be a consideration when assessing the viability of any new technology.

In addition new technologies must be assessed against not just each other but conventional solutions, with the lowest overall lifecycle solutions (factoring in environmental and societal benefits) being employed.

4.3 UNDERSTANDING OUR NETWORKS

Underpinning many of these new technologies is the requirement to understand what is happening on the distribution network in real or near real time. Much of the network monitoring on our lower voltage networks is based on mechanical Maximum Demand Indicators (MDIs) which are checked typically once a year. With a significantly more dynamic and flexible network there is a requirement to understand how that network is operating in real or near real time. This will allow us not only to understand and identify reinforcement requirements as they start to develop but also to actively manage the network.

To address this requirement SP Energy Networks will also be submitting an Innovation Roll out Mechanism bid to Ofgem which seeks to significantly increase and accelerate our network monitoring capabilities as we start to experience the uptake of Low Carbon Technologies (LCTs) required to meet CO^2 emission reduction targets.

4.4 FLEXIBILITY AND SMART GRIDS

Our innovation projects have made it possible to connect over 100MW of generation through Active Network Management that would otherwise have been unable to connect until 2023, resulting in customer and wider societal benefits of £18m. We also have a further 1.3GW of accepted flexible connection offers. To date this has been possible through innovation mechanisms, focused customer service and regulatory mechanisms within the distribution price control. To fully realise a smart, flexible energy system, a more complete review of system charging will be required to ensure that network operators have a sustainable commercial framework to ensure that smart solutions become business as usual options for all GB customers and developers.

As well as the commercial and technical challenges there are some very critical practical areas that have to be recognised and agreed.

At the heart of any smart, flexible system will be a robust, reliable and more fully integrated communications network. This will inevitably lead to an increase in operating costs for network companies when compared with the communication infrastructure that they currently employ.

The South Australian Government's Energy Strategy has a goal of providing South Australia with large scale battery storage for renewable energy so power is available when it is needed, beginning the transformation to the next generation renewable technology.[6] Australia's largest battery will be built in South Australia to store renewable energy and add stability to supply as part of a new $150 million Renewable Technology Fund.

4.5 DISTRIBUTION SYSTEM OPERATOR

If we are to facilitate the transition to a low carbon future in a cost effective way we need to maximise the potential of the existing electrical infrastructure. The evolution of the energy sector towards a smarter system will only be possible if Distribution Network Operator's (DNOs) play an active coordinating role between all market participants, facilitating the markets and services in a neutral and non-discriminatory manner. This can be achieved by extending the current role of DNOs to that of Distribution System Operators (DSOs). An effective DSO model will reduce system balancing costs, whilst enabling the flexible networks necessary to facilitate customer's use of low carbon technologies. It is our opinion that the implementation of a DSO model will optimise customer engagement, minimise costs, improve customer service, manage system losses and optimise investment at a local level.

To this end, SP Energy Networks released a consultation on 'Our DSO Vision'[7] in October of 2016, being the first DNO to do so. Our vision document states our overarching principles of a DSO and outlines the various technical, commercial and regulatory changes required to facilitate this transition. Our vision was developed in conjunction with a range of key stakeholders,

[6] http://ourenergyplan.sa.gov.au/assets/our-energy-plan-sa-web.pdf page 4
[7] https://www.spenergynetworks.co.uk/pages/dso_vision_consultation.aspx

including Scottish Government so as to best represent an informed unbiased view of a future DSO that is capable of meeting the network challenges of the future.

Our vision outlines a DSO as a neutral market facilitator for network balancing services, opening up a currently closed market to a wider range of participants, including; aggregators, communities and distributed generators.

The publishing of our own vision was closely followed by the release of BEIS/Ofgem's joint Call for Evidence on Flexibility[8] and the Winter Package within the EU. Both of which cover the roles and responsibilities of a future DSO in some detail. As a result there has been recognition from the Energy Networks Association that there was a need to address this as an industry, to that effect a new TSO-DSO steering group has been created, which will advise BEIS and Ofgem on the roles and responsibilities of a future DSO and inform their thinking on future flexibility. SP Energy Networks are an active participant of this group and will seek to update Scottish Government on the findings and proposals of the group as they develop.

4.6 OFGEM ENGAGEMENT

If the Scottish Government wants to realise its ambitions set out within the Scottish Energy Strategy it is essential that it continues to support the development of a smart energy grid and the introduction of a DSO model, ultimately providing the lowest cost solution for customers.

Ofgem will develop its strategy for the next transmission price control period later this year. We believe that it is important for the Scottish Government to engage with this process and respond to any future Ofgem consultations as the price control will dictate the levels of investment we can on our networks.

The electricity network is vital in assisting the Scottish Government to realise its 2030 targets, so we believe that its strategy must include an engagement plan for future Ofgem price controls.

4.7 REGULATORY FRAMEWORKS

A prerequisite to a future flexible network is a regulatory and licence framework that is conducive to the technologies and network arrangements outlined above. This matter is especially pressing as the next electricity price controls will begin their negotiation process within the next year.

On the 12th January 2017, we responded to the Department of Business, Energy and Industrial Strategy's/Ofgem's Call for Evidence in relation to "a Smart, Flexible Energy System"[9]. In our response, we make it clear that the regulatory regime currently in place must be amended to ensure that network companies have the ability to own and operate storage in an open market

[8] https://www.gov.uk/government/consultations/call-for-evidence-a-smart-flexible-energy-system
[9] https://www.gov.uk/government/consultations/call-for-evidence-a-smart-flexible-energy-system

approach. Currently, network companies have no ability to own or operate storage unless at an extremely small scale.

4.8 WHOLE SYSTEM PLANNING

Traditionally distribution networks and transmission networks have identified network issues independently, developing solutions separately. With the increasing decentralisation of generation, distribution issues are increasingly impacting on the transmission network and so we need to start investigating whole system solutions, ultimately delivering the lowest overall cost for all customers.

There is also the opportunity to investigate cross vector energy solutions, indeed Scottish Government is already supporting the development of such schemes in Levenmouth. We are supportive of the trialling of such schemes as the best way to understand the costs and benefits.

5 DEVELOPING COMMUNITY ENERGY

The consultation document clearly promotes the development of community energy as one of its major themes. SP Energy Networks are supportive of developing and encouraging local community energy schemes, however there are a number of key concerns that need to be addressed to ensure that this does not conflict with other themes set out in the consultation.

Where community energy schemes effectively net off their own energy usage this currently results in a reduction to the Use of System (UoS) charges that they pay to their supplier, and is ultimately used to pay for the distribution and transmission systems. The cost to operate and maintain the existing electrical networks is paid back over a 45 year period through these UoS charges and is shared across all end customers. If the number and scale of community energy groups doing so increases this would result in the UoS costs being shared amongst a reducing population of non-community customers, increasing their energy costs. It is likely that this group will include fuel poor customers, which the energy strategy seeks to help by reducing costs.

Clearly we should not prohibit or deter community energy groups from developing, but to facilitate them whilst avoiding unintended consequences there is a need to review the existing network tariff arrangements.

5.1 NETWORK TARIFF DESIGN

Target Charging Review (TCR)

Earlier this month, SP Energy Networks responded to Ofgem's TCR consultation, which focuses on changes to how electricity network charges are recovered. The TCR centres on the recovery of 'residual charges', (which comprise c50-80% of allowed network revenues).

Whilst supportive of Ofgem's TCR approach, we believe a comprehensive review of the current high percentage of residual charges is carried out to ensure that customers pay, on a more cost reflective basis, the costs they drive on the network. We do not believe this point has been adequately recognised in Ofgem's proposals.

Whole System Charging

SP Energy Networks supports the development of a whole system approach to transmission and distribution charging. In order to achieve this we consider the following is needed:

1. Establish common principles for network tariff structures. We support the adoption of the following principles, which have been tabled by the TSO-DSO Charging Workstream:

    a) Cost-reflectivity;
    b) Predictability;
    c) Cost-recovery;
    d) Non-discriminatory;
    e) Non-distortionary;
    f) Transparency;
    g) Simplicity;
    h) Commonality; and
    i) Flexibility.

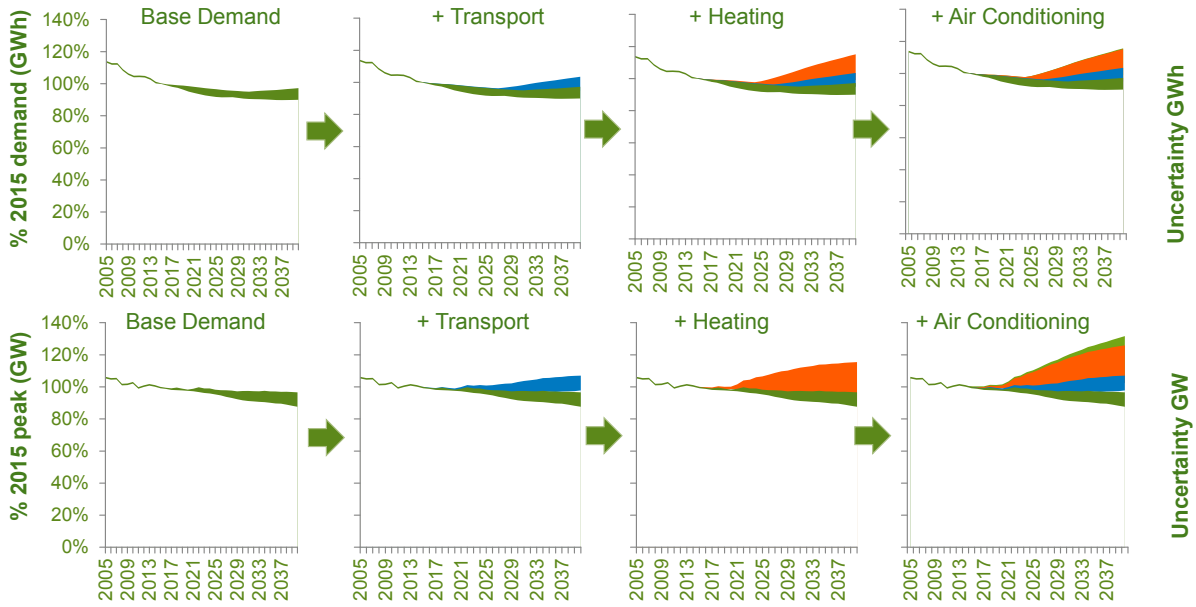
2. Agreement of a common set of cost drivers (across transmission and distribution) which can feed into the development of future T&D charging methodologies.

6 ENERGY EFFICIENCY AND THE LOW CARBON TECHNOLOGY UPTAKE

Within the Transforming Scotland's Energy Use chapter of the consultation document Scottish Government seeks views on aligning with a more ambitious energy efficiency target reflecting EU ambition to target a 30% reduction by 2030. Whilst we acknowledge the exceptional work done to date and the ongoing support of Scottish Government's energy efficiency initiatives we think energy efficiency needs to be considered alongside de-carbonisation targets. As stated in section 122 and section 172 of the consultation heat pumps and electric vehicle uptake are expected to increase electricity usage. Therefore any future energy efficiency targets should either account for the demand increase implicit in the adoption of these technologies or propose a demonstrable method of measuring energy efficiency with the exclusion of these technologies.

Shown below are a range of charts based on the Future Energy Scenarios published by National Grid[10], the scenarios have then been extrapolated for our network areas (including our SP Manweb area).

[10] http://fes.nationalgrid.com/



It can be seen that despite an underlying reduction in base demand the net impact of low carbon technology adoption results in an increase in electrical demand 2017 and 2030.

6.1 FACILITATING THE UPTAKE OF LOW CARBON TECHNOLOGIES

Network companies do not want to be a barrier to the development of a low carbon economy, however we do need to ensure that the networks we operate are both safe and economic. The key challenges that network companies will face include; the scale of uptake, the rate of uptake and how those Low Carbon Technologies will be used by our customers. To meet these challenges a range of mitigating actions need to be considered:-

Monitoring and flexible networks – As outlined in section 5.4 of our response, in order to plan for a range of future scenarios network companies need to understand and monitor our networks more accurately. This will allow us to identify 'clustering' of EVs or EH and plan any network reinforcement requirements ahead of time allowing us to design lowest cost solutions.

Clear Government policy – We have seen with the introduction of incentive mechanisms like Feed in tariffs (FiTs) that Government can significantly alter the rate of uptake of technologies. The same is also true for the System Operator, the Fast Frequency Response (FFR) tender released by National Grid in October 2015 resulted in applications of >25GW of storage to network companies by third party developers. As outlined above network companies do not want to be a barrier to the development of a Low Carbon economy but it is imperative that we are fully engaged with any plans to introduce incentive mechanisms that may result in significant changes to customer behaviour. This will allow us to prepare our systems and networks for any step changes in, for example, EV uptake.

Managing the charging/operating times of LCTs – Charging all electric vehicles in a localised area at the same time will result in a much higher burden on the electrical network than a managed approach to charging. There are a range of solutions to address this which need to be agreed at a national level. In simple terms there are three options – directly managed charging, price signal managed charging and network reinforcement to facilitate charging. It is likely that a combination of all three options will be required, however it should be noted that managed charging does not eliminate the need for network reinforcement but it will reduce the requirement.[11]

Value of electricity to customers – Industry investment decisions are based on cost benefit analysis, which is often backed up by defined values for the Value of Lost Load (VoLL). This metric seeks to attach a value to the socioeconomic cost of losing the supply of energy. There is a need to revisit the evaluation of this metric as the way that customers value both connectivity and energy usage changes. Historically the impact to customers would cover loss of electrical supply in their homes but as we transition to a low carbon economy the loss of supply will also have a significant effect on transport capability and domestic heating.

[11] The cost of charging infrastructure associated with uptake of electric vehicles in GB (ENA, 2016)

7 SUMMARY

SP Energy Networks are broadly supportive of the strategy put forward by Scottish Government and are pleased to see the devolved government outline a long term energy strategy. We do however have concerns in realising this strategy whilst maintaining a safe, secure, reliable and economic electrical network. These concerns also cannot be deferred indefinitely and need to be addressed in the short term rather than the medium-long term. We also believe that any strategy issues need to be addressed as an industry and agreed with central government/regulators to ensure that network companies are adequately incentivised to adapt to a changing energy system.

Outlined below are the key challenges that we believe should be brought out and highlighted within the next iteration of the energy strategy.

- Managing system security and black start capability on an increasingly de-centralised network
- Ensuring that networks are prepared for the uptake of Low Carbon technologies across a range of scenarios. Innovative technologies will mitigate the cost of this transition but ultimately investment in the electrical network will be required.
- Implementing a tariff regime that provided fair and transparent charging, providing the right investment signals and driving customer behaviour to assist in managing the network
- Implementing a DSO model in the UK that addresses the system balancing requirements at lowest overall cost to the UK consumer
- Promoting an energy mix that is both diverse and addresses the requirements of UK base load without excessive additional costs to the UK consumer
- The value of electrical supply to customers and how it may increase as customers rely on electricity to provide transport and heat